

**RONALD MARK THOM**  
Staff Scientist  
Battelle Marine Sciences Laboratory  
Pacific Northwest National Laboratory  
Sequim, Washington

**EDUCATION:**

- A.S., Natural Sciences, 1969, Long Beach City College
- B.S., Biological Sciences, 1971, California State College, Dominguez Hills
- M.S., Marine Algal Ecology, 1976, California State University, Long Beach
- Ph.D., Fisheries, 1978, University of Washington

**QUALIFICATIONS:**

**Dr. Ronald Thom**, who leads the Marine/Wetlands Research area at the Battelle Marine Sciences Laboratory in Sequim, Washington, has over 25 years of professional experience as an algologist, wetlands ecologist, and fisheries biologist. Dr. Thom's research includes benthic primary production; the effects of pollution on nearshore marine systems in California, Washington, and Alaska; habitat construction and restoration of marine and estuarine systems; effects of climate change on estuarine systems; and ecology of fisheries resources in nearshore systems. His recent work for the Washington State Department of Transportation on the effects of ferry terminals and conditions of light, depth, and disturbance on eelgrass was selected by the Federal Highway Administration for the "Environmental Excellence Award." This award recognizes excellence in work that supports "a safe, efficient, and effective transportation system that fits harmoniously within our natural environment, our neighborhoods, and our communities." Earlier work on the Gog-Li-Hi-Te Wetland System in the Puyallup River Estuary, Washington, in which Dr. Thom managed the design, planting, and monitoring of a 10-acre wetland constructed as mitigation by the Port of Tacoma, became a national wetlands demonstration site for the Waterways Experiment Station, US Corps of Engineers. This project also resulted in an award for the Port of Tacoma in 1988 as the most environmentally aware port in the nation. Recent programs have also included an evaluation of habitat restoration projects across the country for the Corps of Engineers Institute of Water Resources. An extension of this program was the development of a training module for agency planners, in which an adaptive approach to planning and management is used in restoration programs.

Dr. Thom is currently a member of the King County Nearshore Technical Committee, which is providing technical guidance to the Central Puget Sound Watershed Forum and WRIAs 8 and 9. The Committee is looking at nearshore habitat and endangered species recovery issues and recommending studies of the nearshore environment to determine needed nearshore preservation, acquisition, and restoration projects. Dr. Thom has recently been appointed to the Technical Advisory team that is developing a framework for prioritizing nearshore and estuarine salmon habitat restoration projects. This framework would be used by the Salmon Recovery Funding Board to make decisions on projects that are funded. Dr. Thom also serves on the Nearshore PRISM working group. This working group is providing research directions through the University of Washington for nearshore systems in Puget Sound. In addition, Dr. Thom participates in the assessment of the effects of the deepening of the navigation channel in the Columbia River estuary. He is developing a conceptual model of the estuary and an adaptive management program for restoration activities.

Dr. Thom serves as an Affiliate Associate Professor, School of Fisheries, University of Washington, and as an Adjunct Professor for Western Washington University Huxley Environmental Studies program.

**SELECTED RESEARCH EXPERIENCE:**

Dr. Thom's work in the development of new research methods has increased our scientific understanding of complex interactions in marine and estuarine environments and, in so doing, has strongly influenced strategic

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client decisions. Some of these important programs are listed below.

- **WSDOT Marine Biology Programs:** A series of marine biological studies such as inventories, restoration, monitoring, diver surveys, and permit coordination conducted for the Washington State Department of Transportation (WSDOT). This program resulted in high technical reviews from resource agencies, and allowed the WSDOT to move ahead with terminal development work. In addition, **this study was nominated by WSDOT for a national award for research that significantly assisted transportation needs. Several projects funded by WSDOT to engineering firms have used Battelle capabilities to assist in the development of terminals plans.** This program resulted in a 4-year, on-call contract with WSDOT to assist them in all of their projects involving marine biology and research in several areas including eelgrass mapping, planting and propeller wash modeling.
- **The Pacific Northwest Coastal Ecosystem Regional Study (PNCERS)** addresses how salmon are affected by variabilities in climate, marine ecosystems, estuarine and riverine ecosystem productivity, and human activities, and the socio-economic consequences of ecosystem change. Dr. Thom manages this program that includes analysis of effects of climatic and geologic variability and human-induced stressors on salmon production; development of methods to assess cumulative effects of stressors on ecosystems; development of methods to control undesirable introduced species; refinement of GIS technologies and numerical models for assessing damage and planning restoration; identification of the vulnerability of ecosystem components to variability; cost/benefit analysis of restoration strategies; and development of an adaptive management system.
- **IWR Restoration Monitoring:** A rigorous analysis of goals, engineering features, performance monitoring, and costs of non-Corps environmental monitoring projects; the development of a training module for a systematic approach toward development of goals and performance criteria relative to monitoring programs; and the development of methods to incorporate adaptive management into restoration projects. **This monitoring program comparison study is the first of its kind in the U.S. This information is critical to the rapidly growing restoration work of the Corps, which will exceed hundreds of millions of dollars annually.**
- **Remedial Investigation and Ecological Risk Assessment of the McCormick-Baxter Superfund site in Stockton, California.** Dr. Ron Thom was manager of the ecological risk assessment portion of this study for the U.S. Environmental Protection Agency, conducted at a former wood preserving facility that operated from 1942 to 1990. **This assessment provided defensible scientific information that will be used by the EPA to determine the level of site clean up that is required and to weigh clean up alternatives against costs. The study addressed the difficult task of sorting out contamination from the site from effects of contamination from other sources. This was critical to the site clean up decision process.**
- **Effects of Petroleum Products on Bull Kelp. This project, which provided the first experimental data other than for birds, demonstrated damage from the Tenyo Maru oil spill off Cape Flattery, Washington.**
- **The Gog-Li-Hi-Te Wetland System in the Puyallup River Estuary, Washington.** Dr. Thom managed the design, planting and monitoring of this 10 acre wetland constructed as mitigation by the Port of Tacoma. **This system has become a national wetlands demonstration site for the Waterways**

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**Experiment Station, US Corps of Engineers. The project resulted in an award for the Port of Tacoma in 1988 as the most environmentally aware port in the nation.**

- Elk River Saltmarsh Restoration. This is an on-going project to document the progress of restoration of a formerly diked salt marsh in Grays Harbor. **The study is the first of its kind in the state and now has a seven-year data base.** This is jointly being done by Battelle and the Washington State Department of Fish and Wildlife.
- Light, temperature, and enriched CO<sub>2</sub> Effects on eelgrass and kelp productivity. This is a research project investigating the effects of global climate change on these two important marine systems. **This research is the first of its kind in the US and results are used by the US Department of Energy and others to evaluate the effects of climate change on marine ecosystems. In addition, these data are useful in evaluating potential eelgrass mitigation and restoration sites.**
- A Review of Eelgrass (*Zostera marina* L.) Transplant Projects in the Pacific Northwest. **This critical review determined the status of transplanting projects from San Francisco through British Columbia, and has been used to formulate state and federal policies regarding eelgrass transplanting in the Northwest.**
- Shoreline Armoring Effects on Coastal Ecology and Biological Resources in Puget Sound. This study was conducted to document published and unpublished accounts of impacts of shoreline armoring on the ecology and biological resources of Puget Sound. Dr Thom managed this portion of a larger study on the topic of shoreline erosion. **The results are being used to help the State department of ecology develop guidelines for armoring shorelines.**
- Restoration of Urban Estuaries: New Approaches for Site Location and Design. This study applied, for the first time, landscape ecology principles to siting and design of restoration projects in northwest estuaries. **The study is used by Washington State Department of Natural Resources to help determine aquatic lands that should be preserved for restoration vs. lands that could be commercially leased by the State.**
- Intertidal and Shallow Subtidal Benthic Ecology. Dr. Thom managed a two-year study of nearshore systems in the vicinity of the proposed METRO sewage outfall in Seahurst Bight, central Puget Sound. **This study was the most comprehensive study of its kind in that region and was used by METRO to justify resiting the outfall in a less environmentally sensitive area.**
- *Spartina* ecology in Willapa Bay. This is a joint project with the University of Washington which is investigating the ecological differences between *Spartina* patches and native (mudflat) habitats in Willapa Bay. Dr. Thom is conducting studies on below-ground spread, benthic microflora, benthic respiration, and marsh accretion rates. **The results can be used to help determine best control practices and for evaluating the ecological effects of invasion of this plant on native systems.** The sponsor in Washington State Sea Grant.
- Ecological studies of seagrass productivity and grazing in Padilla Bay National Estuarine Research Reserve. **Dr. Thom conducted three years of research documenting the production dynamics**

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**and effects of herbivores on the most extensive eelgrass and mudflat system in Washington State for NOAA's National Estuarine Research Reserve program.** These data were used in court to document the ecological importance of this system relative to claims for commercial development in the Bay.

- Effects of Graveling on the Primary Productivity, Respiration, and Nutrient Flux of Estuarine Tidal Flats. This study was conducted for the Washington State Department of Fisheries and evaluated the effects of gravel placement on mudflats for enhancement of clam resources. **This study provided much need data to the State to help them evaluate this methodology in light of expanding needs for shellfish resources.**
- Lincoln Park Shoreline Erosion Control Project: Monitoring for Surface Substrate, Infaunal Bivalves and Eelgrass. Dr. Thom has managed this project since 1984, which is being conducted for the U.S. Army Corps of Engineers, Seattle District. **The results are being used to evaluate the impacts of placement of gravel to renourish an eroding beach in west Seattle.**
- Eelgrass (*Zostera marina* L.) Transplant Monitoring in Grays Harbor, Washington. Dr. Thom transplanted and has monitored planted eelgrass associated with crab/shell mitigation in Grays Harbor for the U.S. Army Corps of Engineers, Seattle District, since 1990. **This project is used by the USACE to document the potential for successful eelgrass transplanting in this system and elsewhere.**
- Accretion rates of low intertidal salt marshes in the Pacific Northwest. This project measured the accretion rates of sediments and organic matter in coastal marshes throughout the northwest to determine for the US Department of Energy if these marshes would succumb to advanced rates of sea level rise. **The data provide an important source of information on sediment trapping rates that can be used to understand, for example, how breaching of dikes around former marshes might reduce sediment loads to estuaries.**
- Long-Term Changes in the Aerial Extent of Tidal Marshes, Eelgrass Meadows and Kelp Forests of Puget Sound. **This report documents for the first time changes in all major nearshore habitats into Region 10, U.S. Environmental Protection Agency.**
- Abundance, Biomass, and Trophic Structure of the Subtidal Infaunal Communities of the Eastern Side of Central Puget Sound. **Dr. Thom managed this first comprehensive sampling of 100 sites in the central Puget Sound region. This study documented possible benthic impacts from the discharge of sewage in central Puget Sound for METRO.**

#### **PROFESSIONAL AFFILIATIONS:**

- American Association for the Advancement of Science
- American Society of Limnology and Oceanography
- Ecological Society of America
- Estuarine Research Federation
- Pacific Estuarine Research Society
- Society of Wetland Scientists

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**ACADEMIC APPOINTMENTS:**

- Affiliate Associate Professor, School of Fisheries, University of Washington (1993 - present)
- Adjunct Faculty, Western Washington University (1994 - present)
- Instructor, Chapman College (1986 - 1987)

**PUBLICATIONS:**

Thom, R.M., and D.K. Shreffler. Draft. *Eelgrass Meadows Near Ferry Terminals in Puget Sound: Characterization of Assemblages and Mitigation of Impacts*. Prepared for the Washington State Department of Transportation by the University of Washington, Seattle, Washington, and the Battelle Marine Sciences Laboratory, Sequim, Washington.

Borde, AB, RM Thom, and ED Fagergren. 2001. "Eelgrass in Captivity: Population Dynamics in a Confined System." PNWD-SA-5311. In *Puget Sound Research 2001 Proceedings. The Puget Sound/Georgia Basin Ecosystem: Status, Stressors, and the Road to Recovery*, February 12-14, 2001, Bellevue, Washington.

Borde, AB, DL Woodruff, RM Thom, JA Southard, and GD Williams. 2001. "Assessment of Eelgrass (*Zostera marina*) Presence and Condition in Rich Passage in June 2001." PNWD-3102. Letter report to the Washington State Department of Transportation by Battelle Marine Sciences Laboratory, Sequim, Washington.

Clements, W, SN Luoma, J Gerritsen, A Hatch, P Jepson, T Reynoldson, and RM Thom. *In Press* (2001). "Stressor Interactions in Ecological Systems." PNWD-SA-5436. In *Ecological Variability: Separating Natural and Anthropogenic Causes of Ecosystem Impairment*, eds. D Baird and A Burton. Society for Environmental Toxicology and Chemistry (SETAC), Pensacola, Florida.

Emmett, R, R Llanso, J Newton, R Thom, M Hornberger, C Morgan, C Levings, A Copping, and P Fishman. 2001. "Geographic Signatures of North American West Coast Estuaries." PNWD-SA-5430. *Estuaries*, 23(6):765-792.

Luoma, SN, W Clements, T DeWitt, J Gerritsen, P Jepson, A Hatch, T Reynoldson, and RM Thom. *In Press* (2001). "The Role of Environmental Variability in Evaluating Stressor Effects." PNWD-SA-5437. In *Ecological Variability: Separating Natural and Anthropogenic Causes of Ecosystem Impairment*, eds. D Baird and A Burton. Society for Environmental Toxicology and Chemistry (SETAC), Pensacola, Florida.

Luoma, SN, W Clements, J Gerritsen, P Jepson, A Hatch, T Reynoldson, and RM Thom. *In Press* (2001). "Separating stressor influences from environmental variability: eight case studies from aquatic and terrestrial ecosystems." PNWD-SA-5435. In *Ecological Variability: Separating Natural and Anthropogenic Causes of Ecosystem Impairment*, eds. D Baird and A Burton. Society for Environmental Toxicology and Chemistry (SETAC), Pensacola, Florida.

Southard, JA, GD Williams, RM Thom, SL Blanton, and AB Borde. 2001. *Eelgrass Restoration at West Eagle Harbor. Phase II: Monitoring and Evaluation*. PNWD-3097. Prepared for the Washington State Department of Transportation by Battelle Marine Sciences Laboratory, Sequim, Washington.

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- Southard, JA, DL Woodruff, AB Borde, PJ Farley, GL Williams, RM Thom, D MacLellan, and R Shuman. 2001. 2001. PNNL-SA-34667. "Fish distribution in submerged shallow water habitats using underwater videography in Puget Sound." In *Puget Sound Research 2001 Proceedings -- The Puget Sound/Georgia Basin Ecosystem: Status, Stressors, and the Road to Recovery*. Bellevue, Washington, February 12-14, 2001.
- Thom, RM, SL Blanton, DL Woodruff, MH Huesemann, GD Williams, and AB Borde. 2001. "Enhancing Carbon Sequestration in Coastal Vegetated Systems." PNWD-SA-5312. Invited presentation at the Eighteenth Annual International Pittsburgh Coal Conference, Newcastle, New South Wales, Australia, December 4-7, 2001.
- Thom, RM, SL Blanton, DL Woodruff, GD Williams, AB Borde, and GD Williams. 2001. "Carbon Sinks in Nearshore Marine Vegetated Ecosystems." PNNL-SA-34668. Invited presentation at the First National Conference on Carbon Sequestration, Washington, D.C., May 14-17, 2001.
- Thom, RM, AB Borde, SL Blanton, DL Woodruff, and GD Williams. 2001. "The Influence of Climate Variation and Change on Structure and Processes in Nearshore Vegetated Communities of Puget Sound and other Northwest Estuaries." PNNL-SA-34977. In *Puget Sound Research 2001 Proceedings--The Puget Sound/Georgia Basin Ecosystem: Status, Stressors, and the Road to Recovery*. Bellevue, Washington, February 12-14, 2001.
- Thom, RM, AB Borde, KO Richter, LF Hibler. 2001. "Influence of Urbanization on Ecological Processes in Wetlands." PNWD-SA-5187. A special publication of the American Geophysical Union.
- Thom, RM, AB Borde, S Rumrill. 2001. "Spatial and Interannual Variability in Eelgrass Abundance and Biomass in Willapa Bay, Washington and Coos Bay, Oregon." PNWD-SA-5404. 16th International Estuarine Research Federation Conference, St. Petersburg, Florida, November 8-11, 2001.
- Thom, RM, AB Borde, S Rumrill, DL Woodruff, and JA Southard. 2001. "Historical Changes and Short-term Spatial and Interannual Variability in Marshes and Seagrass Meadows in Willapa Bay, Washington, and Coos Bay, Oregon." PNWD-SA-5433. Invited presentation to the North Pacific Marine Sciences Organization meeting, Victoria, British Columbia, Canada, September 30, 2001.
- Thom, RM, AB Borde, GD Williams, JA Southard, SL Blanton, and DL Woodruff. 2001. "Effects of Multiple Stressors on Eelgrass Restoration Projects." PNWD-SA-5434. In *Puget Sound Research 2001 Proceedings--The Puget Sound/Georgia Basin Ecosystem: Status, Stressors, and the Road to Recovery*. Bellevue, Washington, February 12-14, 2001.
- Williams, GD, AB Borde, and Thom RM. 2001. "Codiga Farm Wetland Restoration Plan: Vegetation Guidance and Design Review." PNWD-3104. Letter report to the U.S. Army Corps of Engineers, Seattle District, by Battelle Marine Sciences Laboratory, Richland, Washington.
- Williams, GD, JA Southard, SL Blanton, and RM Thom RM. 2001. *Findings of Subtidal Dive Resource Surveys: Anchor Cable BN, Hood Canal Bridge*. PNWD-3100. Prepared for the Washington State Department of Transportation by Battelle Marine Sciences Laboratory, Sequim, Washington.

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- Williams, GD, JA Southard, SL Blanton, and RM Thom RM. 2001. *Geoduck Dive Resource Surveys: Anchor Cable BN, Hood Canal Bridge*. PNWD-3101. Prepared for the Washington State Department of Transportation by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Williams, GD, and RM Thom. 2001. *Development of Guidelines for Aquatic Habitat Protection and Restoration: Marine and Estuarine Shoreline Modification Issues*. PNWD-3087. Prepared for the Washington State Department of Transportation, Washington Department of Fish and Wildlife, and the Washington Department of Ecology, by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Williams, GD, RM Thom, DL Woodruff, MC Miller, RK Kropp, AB Borde, AD Skillman, SL Blanton, J Brennan, and L Blackmore. 2001. "A Comprehensive Assessment of the Central Puget Sound (King County) Nearshore Ecosystem: Historic Changes, Data Gaps, and Pending Threats." PNNL-SA-34562. In *Puget Sound Research 2001 Proceedings--The Puget Sound/Georgia Basin Ecosystem: Status, Stressors, and the Road to Recovery*. Bellevue, Washington, February 12-14, 2001.
- Woodruff, DL, AB Borde, JA Southard, GD Williams, and RM Thom. 2001. *Assessment of Eelgrass (Zostera marina) Presence and Condition in Rich Passage during Summer 2000*. PNWD-3091. Prepared for the Washington State Department of Transportation by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Woodruff, DL, PJ Farley, AB Borde, JA Southard, RM Thom, and MC Miller. 2001. "King County Nearshore Habitat Mapping Data Report: Picnic Point to Shilshole Bay Marina." PNNL-SA-34636. Presented at Coastal Zone '01, July 15, 2001, Cleveland, Ohio.
- Antrim LD, Thom RM, Borde AB, Shreffler DK, and Gardiner WW. 2000 Eelgrass restoration at West Eagle Harbor Phase II: Planting and Monitoring. PNWD-3023, Pacific Northwest National Laboratory, Richland, WA.
- Antrim, LD, RM Thom, AB Borde, and JA Southard. 2000. *Plan for Habitat Protection, Restoration, and Enhancement in the Fidalgo/Guemes Area*. PNWD 3034. Prepared for the City of Anacortes with assistance from the Fidalgo/Guemes Area Technical Committee by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Borde AB, RM Thom, HL Diefenderfer, and SL Blanton. 2000. *The Links of Isolated Waters and Wetlands to Interstate or Foreign Commerce and to the Objectives of the Clean Water Act – Section I Ecological Functions*. Prepared for the US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Oceans and Coastal Protection Division, Washington, DC, by Battelle Duxbury Operations, Duxbury, Massachusetts, and Battelle Marine Sciences Laboratory, Sequim, Washington.
- Emmett, R, R Llanso, J Newton, R Thom, M Hornberger, C Morgan, C Levings, A Copping, and P Fishman. "Geographic Signatures of North American West Coast Estuaries." *Estuaries* 23(6):765-792.
- Noble BD, Thom RM, Green TH, and Borde AB. 2000 Analyzing uncertainty in the costs of ecosystem restoration. PNNL-13181, Pacific Northwest National Laboratory, Richland, WA.
- Thom, RM. 2000. "A Helping Hand—Restoring Wetland Ecosystems." PNWD-SA-5099. *Environmental Protection*, April 2000, p.36-41.

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- Thom, RM. 2000. "Carbon Sinks in Nearshore Marine Vegetated Ecosystems." PNNL-SA-33031. Presented at the Advances in Terrestrial Ecosystem Carbon Inventory, Measurements, and Monitoring conference, Raleigh, North Carolina, October 3-5, 2000.
- Thom, RM, LD Antrim, AB Borde, SL Blanton, WW Gardiner, DK Shreffler, and J Cordell. 2000. *Habitat Mitigation Monitoring at the Clinton Ferry Terminal, Whidbey Island*. PNWD-3021. Prepared for the Washington State Department of Transportation, Olympia, Washington, by the Battelle Marine Sciences Laboratory, Sequim, Washington, and Fisheries Research Institute, University of Washington, Seattle.
- Woodruff DL, PJ Farley, AB Borde, JA Southard, and RM Thom. 2000. *King County Nearshore Habitat Mapping Data Report: Picnic Point to Shilshole Bay Marina*. PNNL-13396. Prepared for King County Department of Natural Resources by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Woodruff, DL, PJ Farley, AB Borde, RM Thom, JA Southard, J Norris, S Wyllie-Echeverria, D MacLellan, and R Shuman. 2000. "Nearshore Habitat Mapping in Puget Sound Using Side-scan Sonar and Underwater Videography." PNNL-SA-33013. Presented at the 6<sup>th</sup> International Conference on Remote Sensing for Marine and Coastal Environments, Charleston, South Carolina, May 1-4, 2000.
- Shreffler, D.K., R.M. Thom, A.B. Borde, W.W. Gardiner. 1999. *Impacts of Ferry Terminals on Migrating Juvenile Salmon: Preliminary Findings of Diving and Light Surveys*. PNWD-2454. Prepared for Washington State Department of transportation, by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Shreffler, D.K., R.M. Thom, A.B. Borde, Kerry Griffin. 1999. *Ecological Interactions among Eelgrass, Oysters, and Burrowing Shrimp in Tillamook Bay, Oregon*. PNWD-2449. Prepared for the Tillamook Bay National Estuary Project by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Simenstad, C.A., B.J. Nightingale, R.M. Thom, and D.K. Shreffler. 1999. *Impacts of Ferry Terminals on Juvenile Salmon Migrating Along Puget Sound Shorelines. Phase I: Synthesis of State of Knowledge. Report No. WA-RD 472.1*. Prepared for Washington State Transportation Commission.
- Thom, R.M. 1999. "Our Nearshore: Passive Conduit or Critical Habitat?" PNWD-SA-4611. Presented at "The Nearshore Environment of King County: The Neglected Link" conference sponsored by the Central Puget Sound Watershed Forum and the Puget Sound Water Quality Action Team, Office of the Governor, January 21, 1999, Federal Way, Washington.
- Thom, R.M. 1999. "U.S. Department of Energy's Carbon Sequestration Working Group: Wetlands Subgroup Report." PNNL-SA-30833. Presented at the conference for The Institute for Wetland Science and Public Policy, Association of State Wetland Managers, Wetlands International: "Wetlands and Climate Change: Scientific Knowledge and Management Options," February 3-4, 1999, at the U.S. Fish and Wildlife Service Patuxent Research Refuge, Laurel, Maryland.
- Thom, R.M., L.D. Antrim, A.B. Borde, W.W. Gardiner, D.K. Shreffler, and J. Cordell. 1999. *Habitat Mitigation Monitoring at the Clinton Ferry Terminal, Whidbey Island. Annual Report Number 2 Covering the Period of August 1996-December 1998*. PNWD-2452. Prepared for Washington State Department of Transportation, by Battelle Marine Sciences Laboratory, Sequim, Washington.



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- Thom, RM, LD Antrim, AB Borde, WW Gardiner, DK Shreffler, PJ Farley, JG Norris, S Wyllie-Echeverria, TP McKenzie. 1998. "Puget Sound's Eelgrass Meadows: Factors Contributing to Depth Distribution and Spatial Patchiness." PNWD-4526. Presented at Puget Sound Research '98 Conference, March 12-13, 1998, Seattle Washington. In *Puget Sound Research '98, Proceedings*, pp. 363-370. Puget Sound Water Quality Action Team, Olympia, Washington.
- Thom, RM, AB Borde, LD Antrim, WW Gardiner, A Reak, WJ Taylor. 1998. *Eelgrass Restoration at Eagle Harbor -- Phase 1: Site and Sediment Evaluation for Eelgrass Meadow Restoration*. PNWD-2423. Prepared for the Washington State Department of Transportation, Olympia, Washington, by Battelle Marine Sciences Laboratory, Sequim, Washington; Battelle, Pacific Northwest Division, Richland, Washington; Parametrix, Inc., Kirkland, WA; Taylor Associates, Seattle, WA.
- USEPA (U.S. Environmental Protection Agency). Draft 1998. *Local Government Involvement in Mitigation Banking*. PNWD-2438. Prepared for the U.S. Environmental Protection Agency, Ocean and Coastal Processes Division, Washington, D.C., by Battelle Duxbury Operations, Duxbury, Massachusetts, and Battelle Marine Sciences Laboratory, Sequim, Washington. Contributing authors: AB Borde and RM Thom.
- Antrim, L.D., C. Lucero, A. Borde, R. Thom, S. Britsch, and J. Holtrop. 1997. *Water Quality Study of the Agnew Constructed Wetland for the Period July 1994 to July 1996*. PNWD-2396. Prepared for Clallam Conservation District, Port Angeles, Washington, by Battelle Marine Sciences Laboratory, Sequim, Washington.
- Simenstad, CA, AM Olson, and RM Thom. 1997. *Mitigating Potential Impacts of Ferry Terminal Siting and Design on Eelgrass Habitat*. Prepared for the Washington State Transportation Commission in cooperation with the U.S. Department of Transportation, Federal Highway Administration. Published by Washington Sea Grant Program Publications, University of Washington, Seattle, Washington.
- Thom, R.M. 1997. "System-Development Matrix for Adaptive Management of Coastal Ecosystem Restoration Projects." PNNL-SA-28791. *Ecological Engineering* 8:219-232.
- Thom, R.M., L.D. Antrim, A.B. Borde, W.W. Gardiner, and J. Cordell. 1997. *Habitat Mitigation Monitoring at the Clinton Ferry Terminal, Whidbey Island*. PNWD-2402. Prepared for the Washington State Department of Transportation by Battelle Marine Sciences Laboratory, Sequim, Washington; Battelle, Pacific Northwest Division, Richland, Washington.
- Thom, R.M., and A.B. Borde. 1997. *Evaluation of Habitat Mitigation Alternative for the Manchester Annex RI/FS*. PNWD-2380. Prepared for Hart Crowser, Inc., Seattle, Washington, and the U.S. Army Corps of Engineers, Seattle District, Seattle, Washington, by Battelle Marine Sciences Laboratory, Sequim, Washington; Battelle, Pacific Northwest Division, Richland, Washington.
- Thom, R.M., and A.B. Borde. 1997. "Planning Aquatic Ecosystem Restoration Monitoring Programs." PNNL-SA-28660. Prepared for the U.S. Army Corps of Engineers, Institute of Water Resources, Alexandria, Virginia; presented at the Society for Wetland Sciences, Society for Ecological Restoration:

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“Putting Down Roots: Wetland Restoration in the Landscape.” May 5-7, 1997, Corvallis, Oregon.

Thom, R.M., A.B. Borde, L.D. Antrim, W.W. Gardiner, J.G. Norris, and S. Wyllie Echeverria. 1997. *Eelgrass and Biological Resource Surveys at Shaw Island Ferry Terminal*. PNWD-2397. Prepared for the Washington State Department of Transportation by the University of Washington, Seattle, Washington; Parametrix, Inc., Kirkland, Washington; and the Battelle Marine Sciences Laboratory, Sequim, Washington.

Thom, R.M., A.B. Borde, L.D. Antrim, W.W. Gardiner, J.G. Norris, S. Wyllie Echeverria, T.P. McKenzie. 1997. *Eelgrass and Biological Resource Surveys at Bremerton, Kingston, Southworth, and Vashon Island Ferry Terminals*. PNWD-2386. Prepared for the Washington State Department of Transportation by the University of Washington, Seattle, Washington; Parametrix, Inc., Kirkland, Washington; and the Battelle Marine Sciences Laboratory, Sequim, Washington.

Thom, R.M., T.H. DeWitt, N.P. Kohn, L.D. Antrim, P.J. White, D.K. Shreffler, and J.Q. Word. 1997. *Ecological Risk Assessment of the Surface Water Operable Unit, McCormick and Baxter Superfund Site, Stockton, California*. PNNL-11466. Prepared for the U.S. Environmental Protection Agency, Region 9, San Francisco, California, by Battelle Marine Sciences Laboratory, Sequim, Washington; Pacific Northwest National Laboratory, Richland, Washington.

Thom, R.M., D.K. Shreffler, C.A. Simenstad, A.M. Olson, S. Wyllie-Echeverria, J.R. Cordell, J. Schafer. 1997. “Mitigating Impacts from Ferry Terminals on Eelgrass (*Zostera marina* L.).” In Proceedings: *Wetland and Riparian Restoration: Taking a Broader View*. EPA910-R-97-007. U.S. Environmental Protection Agency, Office of Ecosystems & Communities, Aquatic Resources Unit, Seattle, Washington.

Thom, R.M., and S.A. Thomas. 1997. *Training Module: Planning Aquatic Ecosystem Restoration Monitoring Programs*. PNNL-SA-28175. Prepared for the U.S. Army Corps of Engineers, Institute of Water Resources, Alexandria, Virginia, by Battelle Marine Sciences Laboratory, Sequim, Washington; Pacific Northwest National Laboratory, Richland, Washington.

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